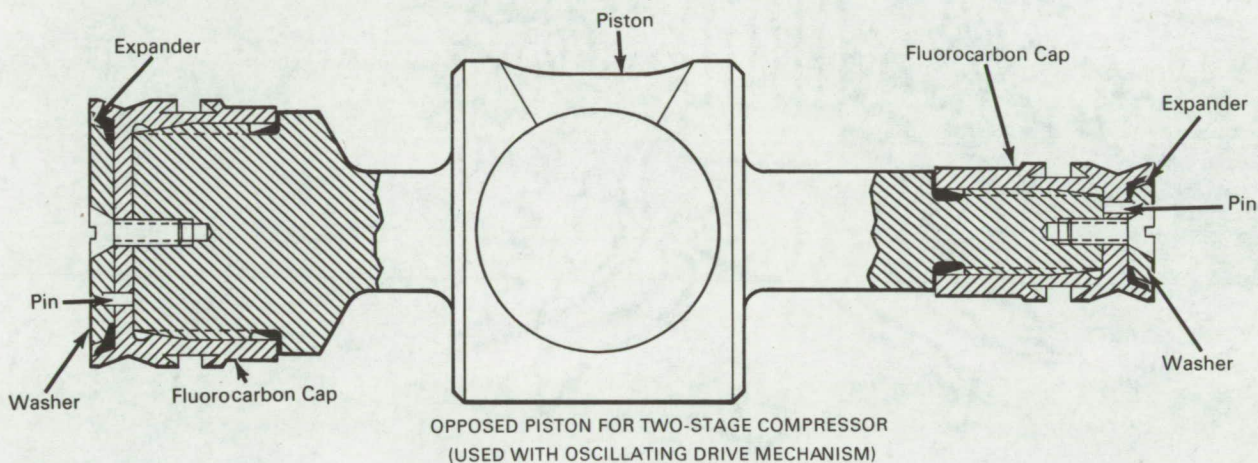


NASA TECH BRIEF



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Fluorocarbon Seal Replaces Metal Piston Ring in Low Density Gas Environment



The problem:

The compression of low density gases requires a closely conforming piston-cylinder configuration. Metal piston rings allowed excessive leakage through the ring gaps as well as leakage loss at bottom dead center (BDC) when the piston ring moved from one side of its groove to the other.

The solution:

A reinforced fluorocarbon cupseal for the piston which eliminates the requirement for rings and provides an integral lip-type seal.

How it's done:

A thread is machined on the ends of the undersized stainless steel piston and oversized fluorocarbon caps are screwed onto the piston and bonded in place with epoxy. The cupseal is then machined to the configuration shown. A lip on the leading edge of the piston forms a seal with the cylinder. A stainless steel serrated disk spring preloads the lip to improve sealing during the low pressure portion of the compression cycle.

Notes:

1. The reinforced fluorocarbon seal performed better than piston rings for the following reasons: The thin sealing lip was sufficiently flexible to conform to the cylinder bore during changing conditions; no ring gap leakage losses; no leakage loss at BDC when a piston ring must move from one side of its groove to the other; no leakage loss from a ring sticking down in its groove; no high friction loss as is encountered when a ring is sufficiently spring loaded with an expander ring to prevent it from sticking in its groove.

The dimensional accommodation through the large temperature range in the course of compression was excellent since the rings were an integral part of the piston and could not shrink into, expand out of, or stick to a ring groove.

2. The fluorocarbon seal may be used as cryogenic compressor piston seals (especially compressors for H_2 or He).

(continued overleaf)

3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B67-10591

Patent status:

No patent action is contemplated by NASA.

Source: W. D. Morath
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of Vickers, Inc.
under contract to
Lewis Research Center
(LEW-10277)